

chapter 5



RESOURCE MONITORING

Chapter 5. Resource Monitoring

5.1 ECOLOGICAL AND BIOLOGICAL RESOURCES

The refuge occurs in a unique and complex hydrological and geomorphological setting. For example, five significant drainages spill off the adjacent Sangre de Cristo Range and disappear into the ground on the refuge, feeding both the shallow, unconfined and underlying, confined aquifers. This, along with wind and other natural forces, supports one of the most unique systems in the North America, the Great Sand Dunes. Combined with adjacent lands managed by NPS, USFS, and TNC, a tremendous opportunity for resource management exists on a large landscape scale (more than 500,000 acres).

The complexity, uniqueness, and value of these new refuge lands demand that refuge managers begin to better understanding the geomorphological setting, as well as other important abiotic characteristics such as soils, in order effectively manage the unique habitats found on the refuge. Complicating effective management and monitoring of this system is the reality of a relatively small refuge staff with very limited resources. Much research will have to be conducted through partnerships with other organizations, but even this approach will require significant staff time for coordination, fund raising, and administration.

Refuge staff have identified geomorphology, hydrology, and other abiotic factors influencing habitat as the most critical research and monitoring needs. Monitoring fish and wildlife, albeit critical to the success of refuge management, will be secondary until a better understanding of the physical setting those animals depend upon is obtained. Specific research and monitoring needs have not been identified yet. However, it is clear that the specific research and monitoring studies must be designed to provide information to assist refuge managers in making well-informed on-the-ground decisions.

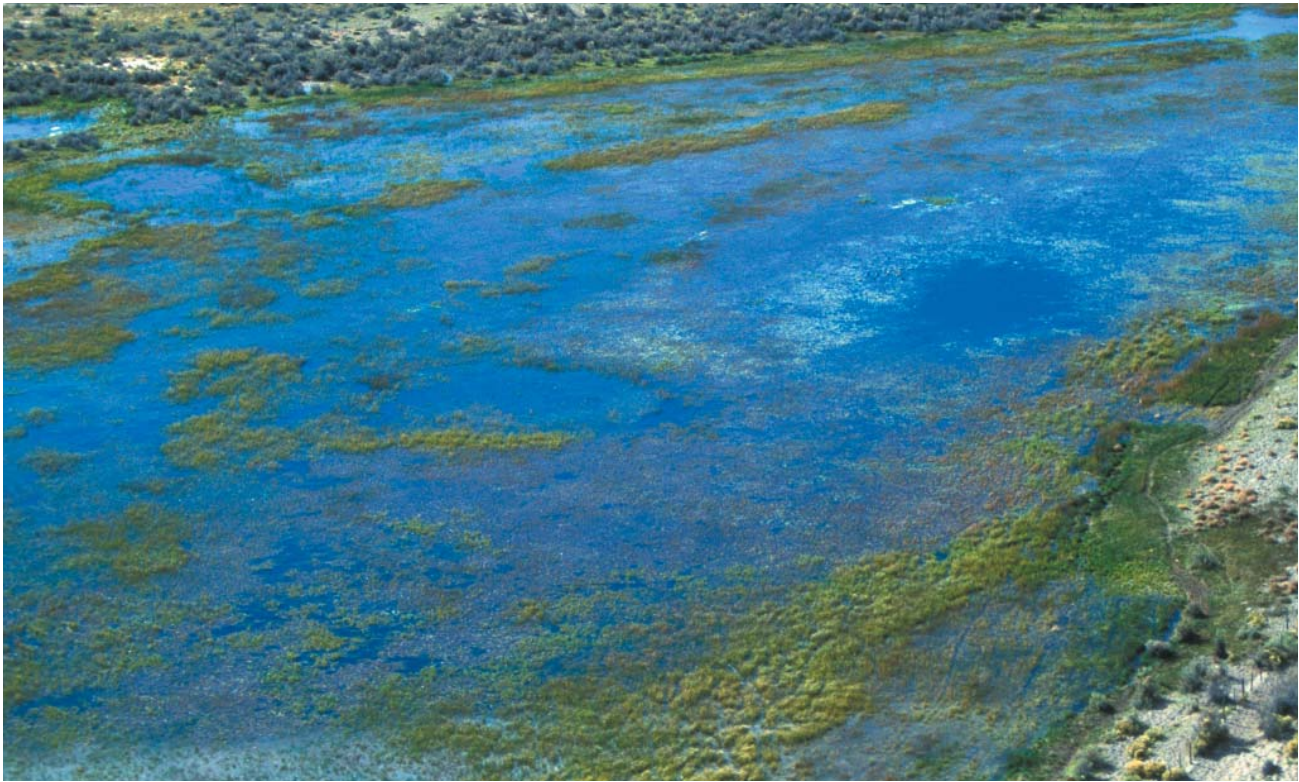
The biological significance and condition of the resources is not fully understood at this time due to limited access and lack of widespread biological inventories. However, given what is known from inventories conducted by the CNHP within the Closed Basin region, the refuge clearly represents a vital component in a large complex of relatively unaltered and intact lands with high biological diversity and ecological richness. CNHP identified 116 “elements” (rare plant or animal species or significant plant communities tracked by CHNP) within the Closed Basin region (Rondeau et al. 1998). Several proposed conservation sites (i.e., areas with high element

occurrences) occur on the Baca National Wildlife Refuge including the Weisman Lakes area and the Cottonwood Creek drainage. Ecologically rich lands surrounding the refuge include the Great Sand Dunes National Park and Preserve, Mishak Lakes Preserve and Medano-Zapata Ranch (TNC), and San Luis Lakes State Park and Wildlife Area. These areas are known to contain highly diverse plant and animal communities, some of which only occur in the San Luis Valley.

Assessing the ecological and biological integrity of the refuge and understanding how it fits into the larger Great Sand Dunes and other valley ecosystems will help lay the groundwork from which habitat-based goals and objectives will be developed. These goals and objectives will help guide on-the-ground management activities, such as water management, and other habitat improvement activities. The Service anticipates that TNC will initiate a preliminary ecological assessment prior to transfer to the Service. If this occurs, the Service will use this information to develop a working knowledge of the biological resources of the refuge, and assist further development of inventory and monitoring protocols. The Service will actively develop partnerships with the research community to assist with the continued inventory of biological resources at the refuge. The Service also will work with the staff from TNC and NPS to develop ecosystem-wide monitoring protocols.

5.2 CULTURAL RESOURCES

The refuge and neighboring lands are known to contain a tremendous amount of cultural resources dating to at least 11,500 years ago. The earliest known inhabitants of the San Luis Valley were the Clovis people who occupied the area around 11,500 to 10,900 years before present (BP) (Jodry 1999). Ancient mammoth sites and tools used by Clovis have been discovered in the region. The Folsom people followed the Clovis around 10,900 to 10,200 years BP. Some prominent Folsom sites in the vicinity include the Linger Folsom site, Zapata Folsom site, and Stewart’s Cattle Guard site (Jodry 1999). A succession of other groups utilized the San Luis Valley from 10,000 to 1,450 years BP, at least seasonally to hunt big game and gather food items like pinon nuts and Indian ricegrass (Jodry 1999; Hoefer 1999). The abundance of water in this region is believed to have attracted a multitude of wildlife, which were in turn used extensively by these early peoples (Jodry 1999).



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Emergent wetland

The Late Prehistoric period, which is typically characterized by the development of some form of agricultural activities in addition to hunting and gathering, occurred between 1,450 to 400 years BP (Martorona 1999). Many sites discovered from this time period occurred near wetlands, streams, and springs, further signifying the importance of water to the survival of early peoples. Remains including projectile points, ceramics, ground stone, fire-cracked rock, and other lithic items are common in these sites (Martorano 1999).

The Protohistoric period began around the mid-1600s to the late-1800s and included the first contact between existing cultural groups and Spanish and Euro-American groups (Martorano 1999). These existing cultural groups included the Ute, Comanche, Apache, Navajo, Arapaho, Cheyenne, and northern Pueblo including the Taos, Tewa, and Tesuque (Martorano 1999). The Ute are considered the primary inhabitants during this period.

The influence of Mexican and Spanish peoples in the area is also quite evident during this time period. Mexican and Spanish settlers established San Luis, the oldest town in Colorado, in 1851. The Trujillo Homestead, which was built in 1879

near the refuge, was recently added to the National Register of Historic Places. The Trujillo Homestead was representative of typical small-scale ranches in the area.

The protection of known culturally significant structures and sites will be a priority for refuge staff. The Service intends to coordinate with the NPS, TNC, and local law enforcement authorities to develop strategies to coordinate law enforcement activities to protect cultural resources.

Over time, the Service will evaluate and inventory additional areas within the Baca Refuge that have not been surveyed. The only area surveyed within the refuge has been the White Ranch property, which was surveyed in 1995 (Mabry et al. 1997). As a result of this effort, 64 new sites, two previously known sites, and 83 isolated occurrence sites were documented, many of which may be eligible for the National Register of Historic Places (Mabry et al. 1997). The Service will survey areas where disturbance to cultural sites, e.g., prescribed fire, may occur.

5.3 HYDROLOGIC RESOURCES

The refuge lies within a topographic basin referred to as the “Closed Basin.” The lowest portion of the Closed Basin is known locally as the “sump,” which

occurs on part of the refuge. Historically, the sump area was described by early explorers as “a vast swamp or bog with a few small lakes, one of which is said to be three miles in length” (Hayden 1869). Hayden went on to note that “although entirely disconnected from any other water system the little streams are full of trout,” referring to the unusual isolation of the Closed Basin in relation to the Rio Grande drainage. Maps generated during the Wheeler Survey in 1871 described the same area of the valley as the “San Luis Valley Marshes.” Presently, the Closed Basin covers approximately 2,940 square miles in the northern part of the valley and is separated from the rest of the valley by a low alluvial fan. Water enters the closed basin through precipitation and snowmelt, and exits primarily through evapotranspiration.

The refuge is underlain by two relatively distinct aquifers, the unconfined or shallow aquifer, and the confined or deep aquifer. In most areas, the unconfined aquifer ranges to a depth of about 100 feet. Where the unconfined aquifer comes to the surface, natural seeps, wet meadows, and interdunal wetlands typically result. Below the unconfined aquifer are a number of clay-based layers that serve to separate, although not disconnect entirely, the unconfined aquifer from the deeper layers of sands and gravels containing water in the confined aquifer. The clay layers reduce upward movement of water from the deeper layers creating water pressure. In areas where water from the deep aquifer can access the surface through either fractures in the clay layers or wells, artesian water pressure is common. The aquifers are recharged by infiltration of irrigation waters, canal leakage, seepage from mountain streams that flow across permeable alluvial fans, and infiltration from precipitation.

From a water resources standpoint, one of the first priorities will be to assemble all available hydrological information and data. Assembling this information will enable refuge staff to identify any major data gaps, which if obtained, could significantly improve our understanding of the critical hydrological processes. Key information will be sought from agencies, non-governmental organizations, and private consultants collecting hydrological data in and around the refuge. This information will form the basis of the eventual development of a water management plan for the refuge. The hydrology of this region is the glue that holds the Great Sand Dunes ecosystem together and the refuge will play a major role in maintaining and protecting the stability of this resource and the wildlife resources it supports.